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Alberta Ambient Air Quality Objectives Work Plan 2005-2008

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TABLE OF CONTENTS

LIST OF FIGURES ii

1.0 INTRODUCTION 3

2.0 PRIORITIES FOR THE DEVELOPMENT OF AMBIENT AIR QUALITY OBJECTIVES 3

3.0 CARRIED FORWARD FROM PREVIOUS WORK PLAN 4

4.0 PROCEDURES FOR OBJECTIVE DEVELOPMENT 4

4.1 Considerations for Setting Ambient Air Quality Objectives 5

5.0 TIMELINES 7

Appendix A Table of Contents for Assessment Documents 8

Appendix B Ambient Air Quality Objectives Priority Setting Workshop 2004 Proceedings 9

LIST OF FIGURES

Figure 1 Steps in review or development of an ambient air quality objective after prioritization of substances. 6

Figure 2 Timelines for Objective Development 7

1.0 INTRODUCTION

This document outlines the development process and plan of action of Alberta Environment's (AENV's) Environmental Policy Branch for the creation and revision of the Alberta Ambient Air Quality Objectives (AAQOs). Ambient air quality objective development outlined in this plan will occur over the three-year period April 2005 to March 31, 2008.

The second Ambient Air Quality Objectives Priority Setting Workshop was held in October 2004 to receive stakeholder input into the prioritization of substances nominated to the objective development process. The workshop was organized through the Clean Air Strategic Alliance (CASA) on behalf of Alberta Environment.

Participants of the first priority setting workshop, held in October 2000, recommended that a similar method be used in identifying future priorities. The priorities identified in the 2000 workshop were incorporated into a three-year work plan and a multi-stakeholder working group worked with Alberta Environment to complete the work plan.

2.0 PRIORITIES FOR THE DEVELOPMENT OF AMBIENT AIR QUALITY OBJECTIVES

The 2004 Ambient Air Quality Objective Priority Setting Workshop identified seven priority substances. It was recommended that objectives be created for those substances that do not currently have an objective and review those substances that do have an objective. The priority substances identified for the next three-year work plan are:

- Nitrogen oxides (review)
- Benzene (review)
- Benzo(a)pyrene (B(a)P) (as a PAH indicator) (create new)
- Naphthalene (create new)
- Formaldehyde (review)
- Hydrogen fluoride (review)
- Carbonyl sulphide (create new)

3.0 CARRIED FORWARD FROM PREVIOUS WORK PLAN

Ambient air quality objectives were developed, reviewed or created for 19 substances in the previous work plan. However, work on three substances from the previous work plan was not complete:

- Ammonia
- Sulphur dioxide
- Hydrogen sulphide and Total reduced sulphur compounds

These substances will be included in the new work plan.

4.0 PROCEDURES FOR OBJECTIVE DEVELOPMENT

The development procedure for objectives undergoing creation is outlined in Figure 1. Creation of an air quality objective may begin with a scoping phase. The working group could elect to explore approaches to developing an AAQO, then make recommendations on possible approaches on developing an AAQO for a selected group of compounds. The assessment report is the next step, or the first step when a scoping phase is not required. Information relevant to the creation of an AAQO is compiled and reviewed. The Table of Contents for assessment reports can be found in Appendix B. When completed, the assessment report is submitted to the multi-stakeholder working group along with the proposed AAQO for their consideration. At this point, a subgroup with representation from industry, non-governmental organizations and government may be convened to do a thorough review of the proposed objective. After reviewing the available information, the subgroup makes recommendations to the working group.

After review and discussion by the working group, the proposed objective and assessment report are published by AENV. The proposed objective is then posted to the "Air Website" for a minimum 60-day public review. After the review period, the proposed objective may be sent back to the working group and/or subgroup for further consideration in light of comments received. If there are no comments, the new ambient air quality objective is finalized and posted to the AAQO portion of the website.

The *review* of an AAQO takes place where an Alberta objective is currently in place and the objective has been identified as a stakeholder priority. The development procedure for objectives undergoing review is the same as that for creation, as outlined in Figure 1, with the following exceptions: the scoping phase is eliminated; if an assessment report exists it is updated to include new literature; and the final output is a revised objective instead of a new objective.

4.1 Considerations for Setting Ambient Air Quality Objectives

A number of factors should be considered when setting an ambient air quality objective, which may include:

- Adverse health effects: When considering the effects of substances on our health a number of factors will be looked at. These include. What are the assessment endpoints? Who are the sensitive subpopulations? What are the No Observed Adverse Effect Level (NOAEL) and the Lowest Observed Adverse Effect Level (LOAEL) for the substance under consideration?

- Adverse ecosystem effects: When considering ecosystem effects one must also have a clear understanding of the assessment endpoints and what the sensitive subpopulations are (species that are most affected). With vegetation, information on acute effects (exposures to high concentrations for short terms, generally up to 24 hours) and chronic effects (reoccurring exposures to lower concentrations over long terms, generally months or longer).

- Technological and Economic factors: What is the cost of achieving various ambient objective levels? Is appropriate monitoring (source and/or ambient) and control technology available?

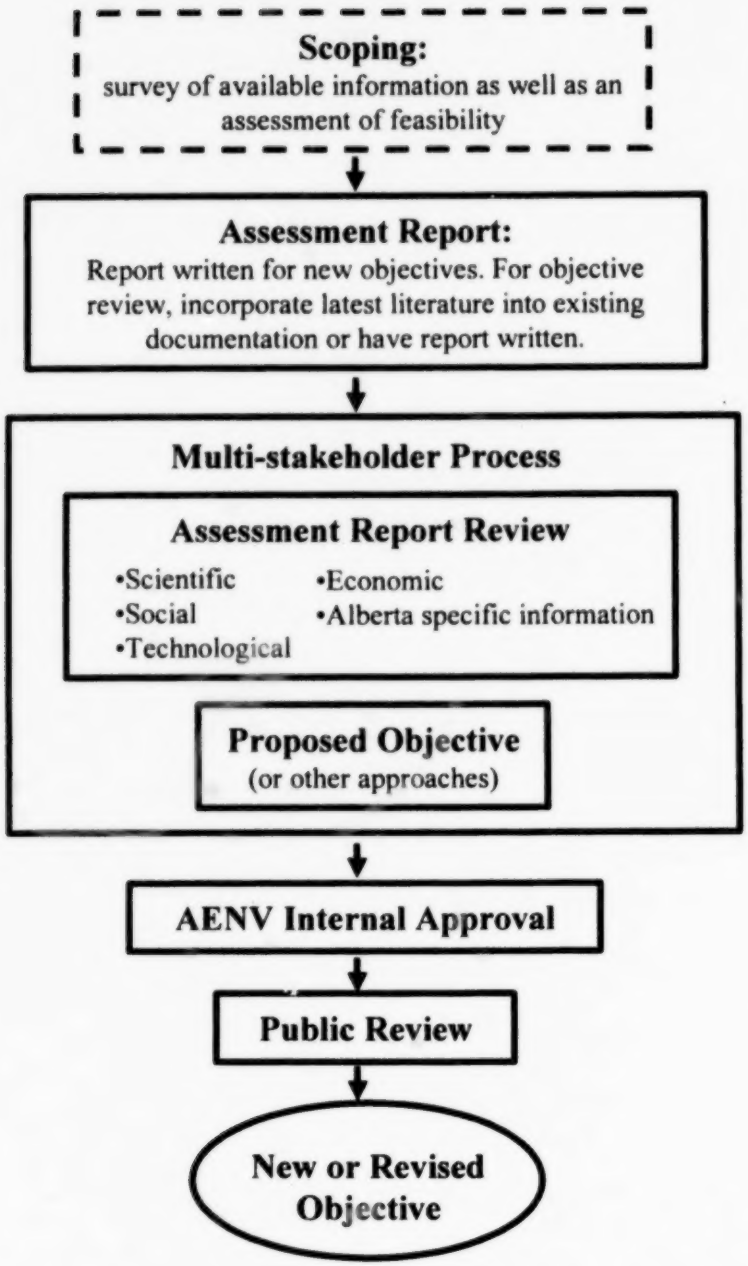

Figure 1 **Steps in the development of ambient air quality objectives after prioritization of substances.**

5.0 TIMELINES

The initial timelines for development of ambient air quality objectives are shown in Figure 2.

Figure 2 Timelines for Objective Development- fiscal year

	05				06				07			
Substance	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Ammonia												
HF												
B(a)P												
Naphthalene												
H_2S and RSC												
Odour												
SO_2												
Benzene												
NO_x												
Formaldehyde												
Carbonyl sulphide												

Note: Q1 – April – June
Q2 – July – September
Q3 – October – December
Q4 – January - March

Appendix A Table of Contents for Assessment Documents

CREATED (NEW) OBJECTIVES

SUMMARY

LISTS OF TABLES AND FIGURES

ACRONYMS AND ABBREVIATIONS

INTRODUCTION

GENERAL SUBSTANCE INFORMATION
- Physical and Chemical Properties
- Emission Sources and Ambient Levels
  - Natural Sources
  - Anthropogenic Sources

ATMOSPHERIC CHEMISTRY AND FATE

EFFECTS ON HUMANS AND ANIMALS
- Effects on Humans
- Effects on Animals

EFFECTS ON VEGETATION

EFFECTS ON MATERIALS

AIR SAMPLING AND ANALYTICAL METHODS
- Reference Methods
- Alternative Emerging Technologies

AMBIENT OBJECTIVES IN OTHER JURISDICTIONS

REFERENCES

REVIEWED OR UPDATED OBJECTIVES ASSESSMENT DOCUMENT - PROPOSED TABLE OF CONTENTS

The first review will be similar to the newly created objectives. Second or subsequent updates will add or update the assessment document created during the first review.

Appendix B Ambient Air Quality Objectives Priority Setting Workshop 2004 Proceedings

Priority Setting Workshop 2004
Proceedings

Acknowledgements

Alberta Environment provided the funding for this workshop, the results of which will be used to guide the process for developing ambient air quality objectives for priority substances.

The Priority Setting Workshop Organizing Committee was responsible for arranging the workshop, and acknowledges the support of all participants who shared their time and expertise.

About CASA

The Clean Air Strategic Alliance (CASA) is a non-profit association composed of stakeholders from three sectors – government, industry and non-government organizations such as health and environmental groups. All CASA groups and teams, including the board of directors, make decisions and recommendations by consensus. These recommendations are likely to be more innovative and longer lasting than those reached through traditional negotiation processes. CASA's vision is that the air will be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals or the environment.

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Contents

1 Introduction 1

1.1 Background 1

1.2 Workshop Goal and Filter Process 1

1.3 Questions and Discussion 2

2 Identification of Priority Substances 3

2.1 Priority List of Substances 3

2.2 Substances that Require Additional Consideration 4

2.3 Other Substances 5

2.3.1 Sulphur dioxide and carbon disulphide 5

2.3.2 Odours 5

3 Conclusions and Recommendations 7

3.1 Consensus Recommendations 7

3.2 Non-consensus Recommendation 7

Appendix A: Workshop Participants 8

Appendix B: Substances Identified at the 2000 Priority Setting Workshop for which Objectives Have Been or Are Being Developed 9

Appendix C: Substances Considered by Breakout Groups, and Rationale for Priorities 10

Compounds, Abbreviations and Acronyms

AAQOWG	Ambient Air Quality Objectives Working Group
B(a)P	Benzo(a)pyrene
BATEA	Best Available Technology Economically Achievable
BTEX	A mixture of benzene, toluene, ethylbenzene and xylene
CASA	Clean Air Strategic Alliance
CS_2	Carbon disulphide
EPT	Electricity Project Team (of CASA)
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides (also oxides of nitrogen)
NPRI	National Pollutant Release Inventory
NRCB	Natural Resources Conservation Board
OSB	Oriented Strand Board
PAH	Polycyclic Aromatic Hydrocarbons
PM	Particulate matter
PSW	Priority Setting Workshop
SO_2	Sulphur dioxide
TLV	Threshold limit value
VOCs	Volatile organic compounds

1 Introduction

Matthew Dance, CASA project manager for the Priority Setting Workshop (PSW) Organizing Committee, convened the workshop (see Appendix A for a list of participants). He noted that CASA is holding this workshop as a means of providing input to Alberta Environment on priority substances for which ambient air quality objectives should be set. Long Fu and Wendy Lyka from the organizing committee presented additional background on the priority setting process and the work done by the committee in preparation for the workshop. Matthew also presented information about CASA and the consensus process, and reviewed the agenda for the day. He noted that the product of the workshop will be submitted to Alberta Environment and that a final report, including the workshop outcomes, will be prepared for the CASA board.

1.1 Background

Alberta Environment is mandated under section 14 of the *Environmental Protection and Enhancement Act* to set ambient air quality objectives. These objectives are an important component of the air quality management system in Alberta for several reasons. When an objective is written into a facility approval, it becomes a legal requirement for that facility. The objectives are also very useful in airshed management and planning, and for communicating the state of air quality to the public.

Alberta Environment considers scientific, social, technological, economic and other factors when objectives are set. The department manages and co-facilitates a multi-stakeholder working group[1] that provides ongoing advice on setting air quality management objectives. The first priority setting workshop was held in 2000, and was organized by CASA. The priorities from that workshop were incorporated into a three-year work plan for the department, which is now nearing completion. Long Fu presented a list of substances for which objectives had been developed or reviewed or were in development as a result of the previous objective-setting process. Work remains to be done on four substances (three sulphur compounds and ammonia). The priority substances identified from the 2004 workshop will be incorporated into a new three-year work plan for Alberta Environment.

1.2 Workshop Goal and Filter Process

The goal for the 2004 workshop was to provide a short list of 10-15 substances to Alberta Environment's objective-setting process. It was desirable to produce a consensus short list for Alberta Environment but if that was not possible, department staff would use their best judgment in selecting substances from the longer list submitted to them.

The PSW organizing committee developed a filter process to give workshop participants more information and tools to help prioritize the substances. A number of filters were developed with the goal of identifying those substances for which ambient objectives are in the process of being created, or substances that have undergone a process to create an ambient objective. Additional information was provided to participants in the background package distributed prior to the workshop.

[1] The Ambient Air Quality Objectives Working Group.

1.3 Questions and Discussion

In response to several questions from participants, the following additional information was provided for clarification.

- In the breakout groups, participants will still have the opportunity to add substances that did not make it onto the ranked list for one reason or another. This will include substances nominated by the public and those for which ambient objectives already exist, since this is the only process by which Alberta Environment receives input on which substances should be reviewed. The ranked list is a tool to be used in refining the priority list of substances.
- Factors such as technology, economics, and others will be fully considered later in the objective-setting process and lack of information on these factors should not prevent them being considered as a priority for further work.
- The public was invited, through newspaper ads and Internet postings, to submit their priority substances for consideration. Approximately 60 individuals made submissions, and this was considered a good response.
- It was noted that there are some errors in the threshold numbers for benzene.
- The Ambient Air Quality Objectives Working Group (AAQOWG), formed after the last workshop to work with Alberta Environment, gathered more information on health, environmental and other factors. Where required, subgroups were formed for each compound and group of compounds to look at the analyses, trends and other available information. The AAQOWG made recommendations to Alberta Environment in each case. They decided, for example, that some VOCs (volatile organic compounds) and heavy metals warranted having an objective, while others did not. In some cases, such as mercury, the AAQOWG thought there were better ways to address the substances than through the use of ambient objectives. Workshop participants agreed it would be useful to know which compounds the AAQOWG reviewed and then decided not to recommend that an ambient objective be developed. (Note: A list of these substances was provided for each breakout group.)
- The Threshold Limit Values (TLV) are occupational health and safety based numbers, designed to protect workers who are normal healthy adults.

2 Identification of Priority Substances

Participants worked in three facilitated breakout groups to develop a list of substances for further discussion in the plenary session. Each breakout group was given the list of substances arising from the 2000 priority setting workshop, for which objectives have been or are being developed, as well as the list for which it was decided not to develop objectives. These lists are shown in Appendix B.

With this background information, each breakout group prepared a list of priority substances for discussion by all workshop participants (see Table 1). The substances are not listed in any particular order in the table. The longer lists considered by each group, along with any rationale for why the substances in Table 1 should be considered priorities, are provided in Appendix C.

Table 1: Priority Substances Identified by Breakout Groups

Group 1	Group 2	Group 3
Benzene	NOx	NOx (NO_2 and NO)
Benzo(a)pyrene (B(a)P)	PAH indicators	Benzene
Formaldehyde	Benzene	Naphthalene
NO_2	Mercury	Odour compounds
Cobalt	PAH group	Sulphur hexafluoride
Carbonyl sulphide	Vinyl acetate	Hydrogen fluoride (24-hr)
Naphthalene	Carbon disulphide	Formaldehyde
Aluminum	Cobalt	
Carbon disulphide	Sulphur dioxide	
Radionuclides	Selenium	

2.1 Priority List of Substances

After reviewing and discussing the three lists, participants agreed by consensus in the plenary session to put forward the following list of priority substances for which ambient air quality objectives should be developed or for which existing objectives should be reviewed:

- Nitrogen oxides
- Benzene
- B(a)P (PAH indicator)
- Naphthalene
- Formaldehyde
- Hydrogen fluoride
- Carbonyl sulphide

Participants readily agreed that the first four substances should be on the priority list (nitrogen oxides, benzene, benzo(a)pyrene, and naphthalene), then entered into discussion about the final three substances. Participants agreed to add formaldehyde, hydrogen fluoride and carbonyl sulphide to the priority list for the following reasons:

- Formaldehyde was on a previous list considered by the advisory group to Alberta Environment and was dropped because the reference concentration at the time was generally above the ambient levels being experienced. However, Health Canada has re-evaluated the reference concentration and it has been increased dramatically. As well, oriented strand board

facilities in Alberta are a source of this compound. For these reasons, it was agreed to include formaldehyde on the priority list.

- A 24-hour objective is needed for hydrogen fluoride to supplement existing standards.
- New research data is now available on carbonyl sulphide and it is also on the National Pollutant Release Inventory (NPRI) list. It is one of the partially oxidized components of combustion and is an important reduced sulphur compound.

2.2 Substances that Require Additional Consideration

Workshop participants engaged in considerable further discussion about the fate of the remaining substances that were brought forward by the three breakout groups (Table 1). It was agreed by consensus that the following substances, listed in no particular order, require additional attention. Specifically, additional information should be gathered on these substances, and this information should be provided as input to the next priority setting workshop in three to four years. The group discussed each substance, and further elaboration is provided below.

Substances for which additional information is required:

- Aluminum
- Radionuclides
- Sulphur hexafluoride
- Mercury
- Vinyl acetate
- Selenium
- PAH group
- Cobalt

All participants readily agreed that aluminum and radionuclides require further attention.

Sulphur hexafluoride is one of the six main greenhouse gases covered by the Kyoto Protocol; although emitted in much smaller quantities than carbon dioxide, on a molecular basis, its potential as a global warming agent is 29,000 times greater than carbon dioxide. SF_6 is found in electrical switches and a few other small sources. Its ambient levels are low, but it is an important substance.

Mercury – Participants noted that the management framework developed by CASA's Electricity Project Team (EPT) is expected to deal with most of the point source mercury emissions in Alberta, achieving a reduction of 50-80% by 2009. Work is also underway to develop a BATEA (Best Available Technology Economically Achievable) standard for mercury, which will not be less stringent than current commitments. Mercury in food, soil and water is regarded as a more serious problem than mercury in the air; there is also the issue of transboundary emissions, with significant amounts of mercury coming into Alberta from international sources. Some participants noted that Alberta Environment is addressing regional deposition. If there is an ambient objective, it will be necessary to monitor the substance, and some concern was expressed about whether this would add to activities that are already underway. Particular concerns were expressed by residents who live near coal-fired power plants, the main source of mercury in Alberta. When there are weather inversions and fog, higher levels of ambient mercury are experienced in these areas, and further work needs to be done to assess this risk. Workshop participants agreed to recommend more work on mercury, noting that much more information should be available in a few years as the EPT's recommendations are implemented.

Vinyl acetate was identified by Strathcona Industrial Association members as a substance that warrants additional work.

Selenium – It was noted that ambient air is not a good way to measure selenium. If selenium were measured at any concentrations in ambient air, the levels would be of concern. It is probably more important to measure what is in the soil and water and measure selenium emissions at source. Nevertheless, it would be useful to gather further information on this substance.

PAH group – Participants noted that naphthalene, which is on the priority list, is not a good PAH indicator, but B(a)P could be used as a surrogate indicator. Some concern was expressed that leaving the PAH group on a list for further consideration would take a great deal of time and effort. It was nevertheless agreed to put the PAH group on the list of substances for further work.

Cobalt is known to be deficient in the soil, but there is not yet enough information on ambient levels to determine its significance as a priority substance.

2.3 Other Substances

2.3.1 Sulphur dioxide and carbon disulphide

Two other substances appeared on the lists from the breakout groups: sulphur dioxide (SO_2) and carbon disulphide (CS_2).

An ambient objective is being developed for SO_2 so action to deal with this substance is in progress.

It was agreed by consensus that CS_2 is a substance of concern and participants want to ensure that it is addressed. An objective is expected to be issued in a relatively short time and efforts should be made to ensure that work on this objective is completed.

2.3.2 Odours

"Odours" appeared on one breakout group's list. Odours differ from other substances in that they comprise many compounds. If people smell an objectionable odour, some process would be triggered, but the process now varies depending on what the source is and if it is an ambient odour. How odour complaints are addressed is an important question and an ambient air quality objective may or may not be part of the way this problem is addressed. From a health concern, ammonia and hydrogen sulphide are the odour compounds we know most about and these are addressed through ambient objectives.

The working group on objective development has discussed at length how to deal with odours from intensive livestock operations. One option is to develop an odour management framework, but there is no consensus as to whether a framework should include an odour objective. The Intensive Livestock Working Group and Alberta Agriculture, Food and Rural Development will be bringing a statement of opportunity to the CASA board in November 2004 regarding air quality issues associated with confined feeding operations, and there is some uncertainty about how the various processes will fit together. The NRCB also responds to odour concerns.

One problem with odours is that they tend to be repeat occurrences of reduced exposure for short durations. These events are very disturbing to people's lives, but it is difficult to deal with exposures of 1-3 minutes that simply don't get covered by a one-hour guideline. This issue is complex and divisive, it won't go away and it is not unique to Alberta.

Participants acknowledged that odour is a bigger issue than this workshop can address. There was general agreement that an odour management framework is needed, but there was no agreement about whether such a framework should include an ambient objective. It was agreed that a non-consensus recommendation should come out of the workshop, advising that odour is an important issue, and that Alberta Environment should formulate a plan for developing and implementing an odour management framework for the province.

3 Conclusions and Recommendations

3.1 Consensus Recommendations

Workshop participants agreed by consensus to recommend that:

1. Ambient air quality objectives should be developed, or existing objectives reviewed, for the following seven priority substances:
    - Nitrogen oxides
    - Benzene
    - B(a)P (PAH indicator)
    - Naphthalene
    - Formaldehyde
    - Hydrogen fluoride
    - Carbonyl sulphide

2. Additional information on the following substances should be compiled as background and input to the next priority setting workshop in three to four years:
    - Aluminum
    - Radionuclides
    - Sulphur hexafluoride
    - Mercury
    - Vinyl acetate
    - Selenium
    - PAH group
    - Cobalt

3. The ambient air quality objectives being developed for carbon disulphide and sulphur dioxide should be completed as quickly as possible.

3.2 Non-consensus Recommendation

Workshop participants recognized the importance of odours as an air quality issue, but were unable to agree on how they should be addressed.

Thus the non-consensus recommendation from the workshop is that:

> Alberta Environment should formulate a plan for developing and implementing an odour management framework for the province.

Appendix A: Workshop Participants

Ron Axelson	Alberta Cattle Feeders' Association
Randall Barrett	Alberta Environment, Northern Region
Laura Blair*	Alberta Environment
Bill Bocock	Rose Ridge Citizens
Karina Bodo	Alberta Health and Wellness
Jim Bolton	TransAlta
Claude Chamberland	Shell Canada
Matthew Dance*	CASA Secretariat
Jim Dixon	NOVA Chemicals
John Drinkwater	BP
Kim Eastlick	Alberta Energy and Utilities Board
Long Fu*	Alberta Environment
Geoff Granville	Shell Canada
David Gue	Grasslands Naturalist Society and Palliser Airshed
Karen Haugen-Kozyra	Alberta Agriculture, Food and Rural Development
Ahmed Idriss	CASA Secretariat
Brent Korobanik	Strathcona Industrial Association
Martha Kostuch	Prairie Acid Rain Coalition
Ingrid Liepa	CASA Secretariat
Bernice Lloyd	CASA Secretariat
Wendy Lyka*	NOVA Chemicals
Alex Mackenzie	Alberta Health and Wellness
Kevin McCullum	Strathcona Industrial Association
Russ Miyagawa*	Toxics Watch Society
Myra Moore	Fort Air Partnership
Penny Mosmann	Health Canada
Bob Myrick	Alberta Environment, Monitoring & Evaluation
David Onuczko	Northeast Capital Industrial Association
Crystal Parrell	Alberta Environment, Monitoring & Evaluation
Ian Peace	Residents for Accountability in Power Industry Development
George Pfaff	Petro-Canada
Rick Phaneuf	Alberta Environment
Steve Probert	Capital Health
Michael Queenan*	Residents for Accountability in Power Industry Development
Sheldon Roth	University of Calgary
Kim Sanderson	Recorder
Bob Scotten	West Central Airshed Society and Palliser Airshed Society
Kristopher Siriunas	Alberta Energy and Utilities Board
Dennis Stefani	Calgary Health Region
Marilyn Thomas	United Church Women
Jocelyn Thrasher-Haug	Strathcona Industrial Association
Joan Tingley	ATCO Power
Kevin Warren	Parkland Airshed Management Zone and Peace Airshed Society
Brenda Woo	Health Canada
Ruth Yanor	Mewassin Community Action Council

* indicates member of Priority Setting Workshop Organizing Committee

Appendix B: Substances Identified at the 2000 Priority Setting *Workshop for which Objectives Have Been or Are Being Developed*

Following is the list of substances identified in the 2000 Priority Setting Workshop, for which objectives have been or are being developed:

- Heavy metals
  - Arsenic
  - Manganese
  - Nickel
- VOCs
  - Isopropyl alcohol
  - Hexane
  - Ethyl benzene
  - Toluene
  - Xylenes
- Reduced Sulphur Compounds
  - Hydrogen sulphide (H_2S)
  - Carbon disulphide (CS_2)
  - Mercaptans
  - Total reduced sulphur (TRS)
- SO_2
- Ammonia
- Particulate matter (PM)
- Ozone
- Six air toxics: acetone, acrylonitrile, cumene, ethylene, pentachlorophenol, propylene oxide

Following is the list of substances identified in the 2000 priority setting workshop, for which the Ambient Air Quality Objectives Working Group decided not to develop objectives:

- Heavy metals
  - Mercury
  - Copper
  - Cadmium
  - Vanadium
  - Molybdenum
  - Chromium
- VOCs
  - 1-3 butadiene
  - Formaldehyde
  - Dichloromethane
  - Carbon tetrachloride
  - Bromomethane

Appendix C: Substances Considered by Breakout Groups, and Rationale for Priorities

Breakout Group 1

High priority substances:

- Benzene – There is a guideline but it's from Texas and was developed in 1999, and should be looked at again from an Alberta perspective
- Benzo(a)pyrene – a good surrogate for all PAHs
- Formaldehyde – There is a guideline from Texas. This substance was identified in the last exercise but dropped. It is toxic and there is a growing number of OSB plants emitting it in Alberta.
- NO_2 – A guideline developed in 1975 relates to odour, so it should be looked at again.

Medium priority substances:

- Cobalt – Cobalt is emitted from coal-fired power plants and could become an issue if more coal plants are developed; also high Threshold Limit Value
- Carbonyl sulphide – This substance was on the public list, but didn't make it onto any lists after that, and there is nothing in the fact sheets.

Low priority substances:

- Naphthalene – a PAH, which is highly toxic and high levels are observed.
- Aluminum – concerns are similar to cobalt
- Carbon disulphide – guideline is being developed, but should be kept on the list
- Radionuclides – were on the public list but more information is needed.

Substances that were considered but did not make it onto the priority list:

- $PM_{2.5}$ – Being addressed through a Canada Wide Standard, which will be adopted as an ambient guideline
- PM_{10} – Most sources are natural
- PERC – local sources
- Hydrogen fluoride
- Biological odours – A statement of opportunity is coming to CASA regarding confined feeding operations and air quality, so odours can be addressed through that process
- Total reduced sulphur compounds – being addressed

Breakout Group 2

Priority substances:

- NO_X – because of its role as an acidifying emission
- PAH indicators – can measure specific indicators, but some concern re whole group
- Benzene – Concern is related to long-term exposure, especially in the context of mixtures.
- Mercury – A number of different processes are underway to address mercury, but we need an overall plan.
- PAH group
- Vinyl acetate
- Carbon disulphide
- Cobalt
- SO_2
- Selenium

Substances that were discussed but did not make it on to the final priority list:

- $PM_{2.5}$ – being addressed in other forums

Processes are required to address other substances of concern:

- Mixtures, such as PAHs, BTEX, VOCs
- Odours
- Chronic exposures (total exposures and all pathways

Breakout Group 3

Priority substances:

- NOx (NO_2 and NO)
- Benzene
- Naphthalene – a prototype PAH
- Sulphur hexafluoride – very toxic and corrosive
- Hydrogen fluoride – need a 24-hour objective
- Formaldehyde
- Odour compounds – The group did not have consensus as to whether odour should be on the priority list, but it is a different concept because odours comprise a number of different compounds. Ammonia and H_2S are the key compounds and they are already being worked on. There was no agreement on whether sources are controlled through an odour management framework or whether there is an ambient air quality objective.